

SPIDERS (ARANEAE) INHABITING ELBA PROTECTORATE, RED SEA GOVERNORATE, EGYPT

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ABSTRACT

Elba Protectorate is a northeast afrotropical region in Egypt. The present work is aimed to survey spiders inhabiting this important environmental area. Spiders were hand-collected throughout the period from August 2012 to April 2015. Fifty one species were collected from 16 different habitats. They belonged to 40 genera and 21 families. The dominant species in this survey was *Thomisus* sp. An identification key to spiders of Elba protectorate is presented.

Key words: Spiders, taxonomy, identification key, Elba protectorate, Egypt.

INTRODUCTION

Many Afrotropical elements have their northern limits at Gabal Elba (El-Hennawy, 2008). Elba was confirmed as protected area by the Prime Ministerial Decree (P.M.D.) No. 450 for 1986 and lastly adjusted by P.M.D No. 642 for 1995. Its location is: 22°00'-23°50'N 35°00'-37°00'E with about 35600 km² area. The climatic conditions of this protected area are characterized by a hyperarid climate with hot rainless summers and mild winters. Precipitation falls mainly in the autumn and winter months. The monthly air temperature of Elba ranged between 24–38°C in the summer and 12–26°C in the winter (Attum *et al.*, 2009).

Basuony & Saleh (2005) mentioned that there are many studies concerned with vertebrate animals inhabiting Elba protectorate. However, invertebrates are mostly neglected in this important geographical zone (El-Hennawy, 2008). Spiders are a vital component of most terrestrial ecosystems. They strongly affect the density of insect populations (Wise, 1995). They are good candidates to be bio-indicators, because they form a species rich group, inhabiting all kinds of terrestrial ecosystems (Maelfait & Hendrickx, 1998).

The taxonomists recognized more than 46,000 spider species, which they group into 114 families (World Spider Catalog, 2015). The first study carried out about spiders in Egypt was done by Savigny & Audouin in the 19th century (El-Hennawy, 2000) and 385 spider species were recorded in Egypt (El-Hennawy, 2006). There are only a few studies concerned with arachnids of protected areas of Egypt (El-Hennawy, 2003, 2005, 2008).

El-Hennawy (2008) mentioned that it is necessary to make continuous seasonal survey of arachnid species at Elba protected area. There is a need to know how many species are living as the first point to interpret their ecological role and their importance in this important area. The present study is aimed to survey spiders inhabiting Elba protectorate in Egypt during the period from August 2012 to April 2015, and to present an identification key to spiders inhabiting this area.

MATERIAL AND METHODS

Spiders were collected randomly by hand during 26 trips along the Elba protectorate from August 2012 to April 2015. Spiders were collected from 16 sites (Figure 1). Specimens were examined under a binocular microscope and were preserved in 70% ethyl alcohol (Quasin & Uniya, 2010).

Terminology generally followed Comstock (1913), Petrunkevitch (1939), Levi & Levi (1968), Kaston (1978), Tikader (1987), Dippenaar-Schoeman & Jocqué (1997) and Jocqué & Dippenaar-Schoeman (2006) and these references were also used to identify the collected specimens. The collected spiders were identified to the taxonomic level of family and genus or species level. Specimens from the identified spiders are deposited in Educational Museum of Egyptian Fauna, Zoology Department, Faculty of Science, Assiut University, Egypt.

The dominance structure of the collected spiders was calculated according to Engelmann (1978): subrecedent (below 1.3%), recedent (1.3- 3.9%), subdominant (4-12.4%), dominant (12.5-39.9%), eudominant (40-100%). The identified spider taxa in the present study and in El-Hennawy (2008) were used to introduce an identification key to spiders inhabiting Elba protectorate.

RESULTS

THE HORIZONTAL SURVEY

Among the 295 collected specimens, only 28 of 40 genera and 14 of 51 species could be identified. The 51 species were collected from 16 sites from different habitats during the period of investigation. They belonged to 40 genera and 21 families (Table 1). The dominance structure of the collected spiders shows that there are 5 eudominant species (with frequency): *Thomisus* sp. (89.6%), *Pterotricha* sp. (65.5%), juveniles of Gnaphosidae (58.6%), *Thomisus spinifer* O. Pickard-Cambridge, 1872 (48.2%), and juveniles of Salticidae (41.3%). The dominant species were 19 species: *Benoitia lepida* (O. Pickard-Cambridge, 1876) (37.9 %), *Benoitia* sp., *Zelotes* sp., *Peucetia* sp. (34.4%), *Uloborus* sp. (31.03%), *Peucetia arabica* Simon, 1882 (27.5%), Linyphiidae juveniles, *Thanatus* sp. (24.1%), *Hersilia* sp., *Uroctea* sp., *Mogrur fulvovittatus* Simon, 1882 (20.6%), *Filistata* sp., *Pterotricha conspersa* (O. Pickard-Cambridge, 1872), *Cheiracanthium* sp., *Thanatus albinus* (Audouin, 1825), *Mogrur* sp. (17.2%), and Agelenidae juveniles, *Filistatidae* juveniles, *Eusparassus* sp. (13.7%).

The subdominant spiders were 13 species: Lycosidae juveniles, Theridiidae juveniles (10.3%), *Stegodyphus* sp., *Pterotricha dalmasi* Fage, 1929, *Zelotes laetus* (O. Pickard-Cambridge, 1872), *Synaphosus* sp., *Hersiliola* sp., *Philodromus* sp., Pholcidae juveniles, *Artema atlanta* Walckenaer, 1837, *Plexippus paykulli* (Audouin, 1825), *Latrodectus pallidus* O. Pickard-Cambridge, 1872, and *Xysticus lalandei* (Audouin, 1825) (6.8%). There were 14 recedent species: Araneidae juveniles, Dictynidae juveniles, *Stegodyphus lineatus* (Latreille, 1817), *Trachyzelotes* sp., Liocranidae juveniles, *Uroctea limbata* (C.L. Koch, 1843), Oxyopidae juveniles, *Oxyopes* sp., Prodidomidae juveniles, *Poecilochroa* sp., *Steatoda* sp., *Paidiscura* sp., *Theridion* sp., and *Xysticus* sp. (3.4%).

Key to Elba spiders

1. Cribellum and calamistrum present2
- Cribellum and calamistrum absent5
2. Labium fused to sternum; eyes in a compact group on a slight hump; spinnerets advanced,

located ventrally instead of terminally; carapace narrowed anteriorly; haplogyne.....	Filistatidae
- Labium not fused to sternum	3
3. Femora with rows of long trichobothria; metatarsi IV usually compressed and curved under calamistrum; first pair of legs clearly longer than second pair	Uloboridae
- Femora without rows of long trichobothria; metatarsi IV not like above	4
4. Carapace rectangular; ocular area long, anterior lateral eyes and posterior lateral eyes more than 4 times their diameter apart	Eresidae
- Carapace narrowed in front; ocular area shorter; calamistrum extended over almost the entire of metatarsi IV	Dictynidae
5. Tarsus with two claws	6
- Tarsus with three claws	13
6. Six eyes, in three diads	Sicariidae
- Eight eyes	7
7. Eyes in three rows; anterior median eyes very large; jumping spiders	Salticidae
- Eyes arranged differently	8
8. Legs laterigrade, directed towards sides	9
- Legs prograde, directed forwards and backwards	11
9. Tarsi and metatarsi without scopulae; legs I and II usually much longer than legs III and IV	Thomisidae
- Tarsi and sometimes metatarsi with scopulae; legs different	10
10. Small to medium-size spiders (3-16 mm); chelicerae without teeth or at most one on retromargin; tarsus-metatarsus allowing movement in one plane only.....	Philodromidae
- Medium-size to large spiders (6-35 mm); chelicerae with at least two teeth (rarely one) on retromargin; membranous connection to metatarsus permits free movement of tarsus	Sparassidae
11. Tarsi straight and not pseudo-segment, chelicerae not modified, posterior median eyes oval and pale	12
- Posterior median eyes with dome-shaped lens; endites usually not obliquely depressed; Median spinnerets of females not flattened, without rows of large spigots	Eutichuridae
12. Anterior spinnerets situated slightly forward; spigots elongated with long plumose setae; eyes in circular arrangement or in two rows	Prodidomidae
- Anterior spinnerets terminal; without long setae on spigots; eyes in two rows	Gnaphosidae
13. Tarsi with trichobothria, often in a row	14
- Tarsi without trichobothria	16
14. Clypeus very high; posterior eyes and anterior lateral eyes forming a hexagonal group in front of small anterior median eyes; numerous long spines on legs	Oxyopidae
- Clypeus not as high; eye position and setae on legs different	15
15. Eyes sessile, not on tubercles in three rows; abdomen oval, smoothly rounded posteriorly; egg cocoon carried attached to spinnerets	Lycosidae
- Eyes in two rows; posterior spinnerets long and two-segmented	Agelenidae
16. Posterior spinnerets long to very long, last segment at least three times longer than wide... ..	17
- Posterior spinnerets not unusually long	18

17. Anal tubercle very large, with fringe of long hairs; posterior spinnerets curved around it; carapace almost circular **Oecobiidae**
 - Anal tubercle normal; carapace differently shaped; posterior spinnerets with a median row of spigots **Hersiliidae**
 18. Eyes in three groups, anterior median eyes apart, remainder in two triads; legs thin and long, tarsi pseudosegmented **Pholcidae**
 - Eyes pattern and legs not as above **19**
 19. Paracymbium a separate sclerite; tarsi usually cylindrical, anterior tarsi sometimes fusiform; chelicerae with stridulating file **Linyphiidae**
 - Paracymbium not as above **20**
 20. Tarsi IV with ventral comb of serrated hairs; brownish rings around eyes; femora without spines **Theridiidae**
 - Tarsi without ventral comb of serrated hairs; eyes without brownish rings **Araneidae**

DISCUSSION

The available knowledge of Arachnida in the Egyptian protectorates is something rare. They were studied in seven Egyptian protected areas on the Gulf of Aqaba in South Sinai (Ras Mohammad, Nabq, and Abu Galoum Protectorates) and on the Mediterranean Sea (Omayed, Burullus, Zaranik, and Ahrash [Rafah] protectorates) by El-Hennawy (2003, 2005). The arachnids of Elba protected area were studied for the first time during nine trips to different places in the area (June 1994 - November 2000) (El-Hennawy, 2008). The present study surveyed spiders along the Elba protectorate during 26 trips from August 2012 to April 2015.

Results of the present study showed the existence of 21 families including 40 genera and 51 species. El-Hennawy (2008) reported 11 species of spiders from Elba belonging to 16 families and 22 genera. All families reported by El-Hennawy (2008) were recorded in the present study except family Sicariidae. However, there were 6 families (Agelenidae, Dictynidae, Linyphiidae, Liocranidae, Prodidomidae & Uloboridae) not recorded by El-Hennawy (2008). The increased number of families in the present study may be related to the increase in number of collecting trips (26 trips) than that of El-Hennawy (2008), 9 trips.

Recently, Obuid-Allah *et al.* (2015) revealed the occurrence of 14 families that included 23 genera and 23 species of spiders at Qena Governorate, Egypt which is relatively close to the area of this study. All the families they reported are recorded in the present study. They did not record 7 families: Dictynidae, Eresidae, Filistatidae, Hersiliidae, Liocranidae, Eutichuridae, and Prodidomidae which are recorded in the present study.

In the present work, the most abundant species is *Thomisus spinifer* (O.P.-Cambridge, 1872) of family Thomisidae. However, El-Hennawy (2008) reported that the most abundant species was *Eusparassus walckenaeri* (Audouin, 1825) of family Sparassidae. The difference came from the seasonal and different microhabitats studied. Ziesche & Roth (2008) showed that spider species have a small-scale distribution pattern, significantly affected by vegetation factors. Soil moisture, may affect plant species and adverse environmental conditions for both, spiders and their prey which in turn determine spider assemblages (Harmon *et al.*, 2003; Siira-Pietikainen *et al.*, 2003; Crist *et al.*, 2006; Malumbres-Olarte *et al.*, 2013; Abd El-Wakeil *et al.*, 2014).

In the present work, *Benoitia* sp. of family Agelenidae was recorded with frequency more than 65%. However, El-Hennawy (2008) did not collect this species because of climatic factors and seasonal variation in spiders abundance.

Hersiliidae and Dictynidae families were not collected from the northern region of the protectorate due to decreased relative humidity in northern region compared with southern region; this is compatible with El-Hennawy (2008). On the other hand, family Oxyopidae is not represented in southern part of the protectorate or in El-Hennawy (2008) because of the lack of *Cleom brassicales* plant which is the main host of this family (Vasconcellos-Neto *et al.*, 2007).

Among the previously studied Egyptian protectorates, the nearer results of us are those of the protectorate of Omayed because it is desert region like Elba, while Zaranik protectorate has more diversity because it is located in Asia and with a better plant cover, therefore, it has the highest diversity of spider species that is related to the diversity of insects too (El-Hennawy, 2005).

Elba protected area needs more studies. It is necessary to make continuous seasonal survey of all arachnid species to know how many species are living there and to elucidate their ecological role and their importance in this specific area.

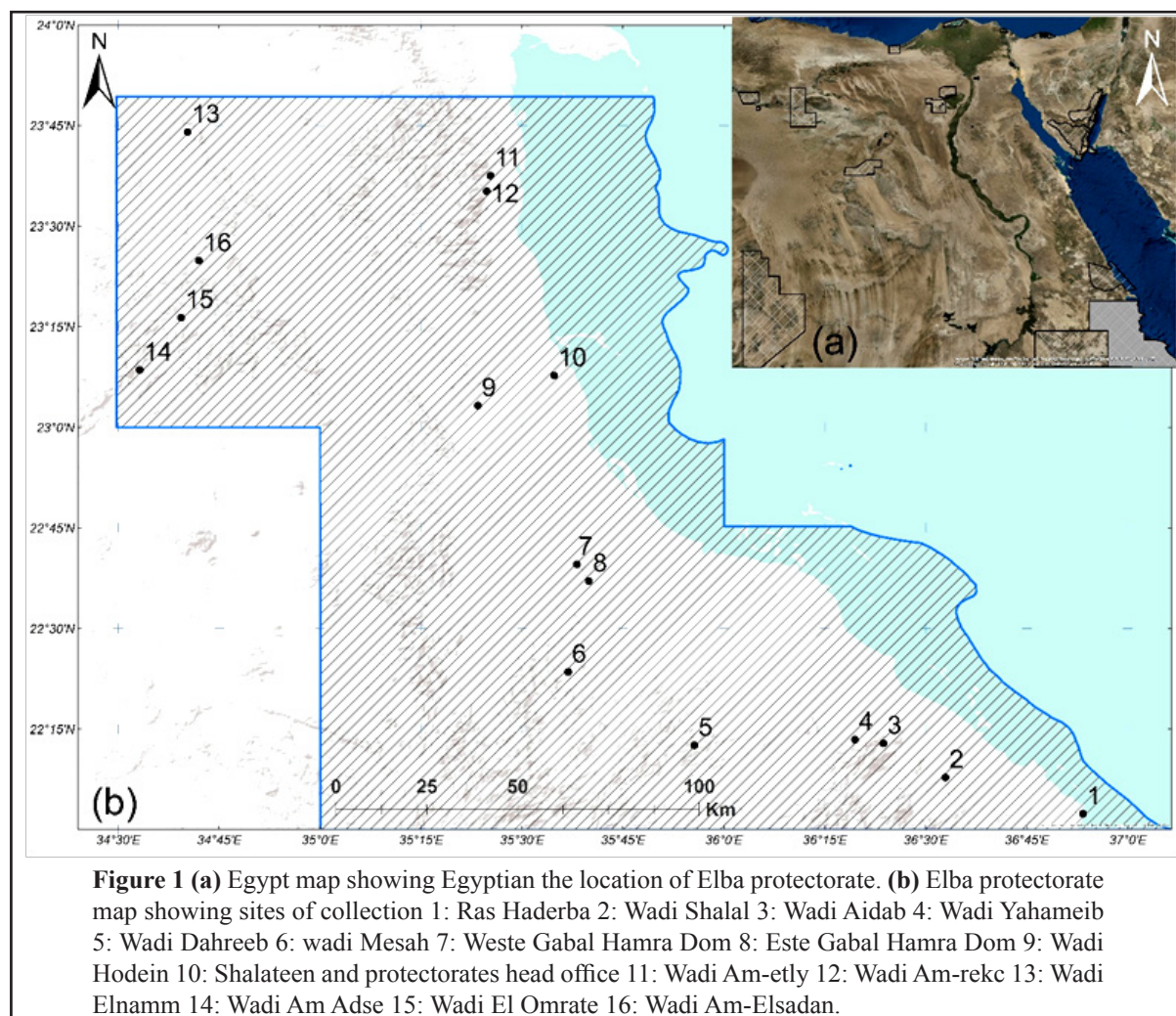


Table 1 Spiders collected from study sites (1: Ras Haderba 2: Wadi Shalal 3: Wadi Aidab 4: Wadi Yahameib 5: Wadi Dahreeb 6: wadi Mesah 7: Weste Gabal Hamra Dom 8: Este Gabal Hamra Dom 9: Wadi Hodein 10: Shalateen and protectorates head office 11: Wadi Am-etly 12: Wadi Am-rekc13: Wadi Elnamm 14: Wadi Am Adse 15: Wadi El Omrate 16: Wadi Am-Elsadan) in Elba protectorate with their percentages of frequency and dominance (subrecedent: bellow 1.3%, recedent: 1.3- 3.9%, subdominant: 4-12.4%, dominant: 12.5-39.9%, eudominant (40-100%).

Family	Genus	Species	Distribution sites	F%	Dominance
Agelenidae	<i>Benoitia</i>	<i>lepida</i>	5,6,8,11,15,16	37.9	dominant
	<i>Benoitia</i>	sp.	2,3,4,5,6,8,11	34.5	dominant
	juveniles	sp.	6,11,12	13.8	dominant
Araneidae	juveniles	sp.	12	3.4	recedent
Dictynidae	juveniles	sp.	1	3.4	recedent
Eresidae	<i>Stegodyphus</i>	<i>lineatus</i>	6	3.4	recedent
	<i>Stegodyphus</i>	sp.	2,7	6.9	subdominant
Eutichuridae	<i>Cheiracanthium</i>	sp.	2,6,9	17.2	dominant
Filistatidae	<i>Filistata</i>	sp.	2,6,11	17.2	dominant
	juveniles	sp.	6	13.8	dominant
Gnaphosidae	<i>Poecilochroa</i>	sp.	10	3.4	recedent
	<i>Pterotricha</i>	<i>conspersa</i>	2,4,6	17.2	dominant
	<i>Pterotricha</i>	<i>dalmasi</i>	4	6.9	subdominant
	<i>Pterotricha</i>	sp.	2,3,4,6,9	65.5	eudominant
	<i>Synaphosus</i>	sp	6	6.9	subdominant
	<i>Trachyzelotes</i>	sp	6	3.4	recedent
	<i>Zelotes</i>	<i>laetus</i>	2	6.9	subdominant
	<i>Zelotes</i>	sp.	3,6,10,11	34.5	dominant
	juveniles	sp.	2,3,6,9,10	58.6	eudominant
Hersiliidae	<i>Hersilia</i>	sp.	3,4	20.7	dominant
	<i>Hersiliola</i>	sp.	3	6.9	subdominant
Linyphiidae	juveniles	sp.	2,10	24.1	dominant
Liocranidae	juveniles	sp.	6	3.4	recedent
Lycosidae	juveniles	sp.	6	10.3	subdominant
Oecobiidae	<i>Uroctea</i>	<i>limbata</i>	11	3.4	recedent
	<i>Uroctea</i>	sp.	3,6,11	20.7	dominant
Oxyopidae	<i>Oxyopes</i>	sp.	9	3.4	recedent
	<i>Peucetia</i>	<i>arabica</i>	11,12,15	27.6	dominant
	<i>Peucetia</i>	sp.	6,11,15	34.5	dominant
	juveniles	sp.	12	3.4	recedent

Philodromidae	<i>Philodromus</i>	sp.	6,9	6.9	subdominant
	<i>Thanatus</i>	<i>albin</i>	10,11	17.2	dominant
	<i>Thanatus</i>	sp.	3,9,10	24.1	dominant
Pholcidae	<i>Artema</i>	<i>atlanta</i>	10	6.9	subdominant
	juveniles	sp.	3,4	6.9	subdominant
Prodidomidae	juveniles	sp.	13	3.4	recedent
Salticidae	<i>Mogrus</i>	<i>fulvovittatus</i>	9,10,15	20.7	dominant
	<i>Mogrus</i>	sp.	2,4,9,10	17.2	dominant
	<i>Plexippus</i>	<i>paykulli</i>	10	6.9	subdominant
	juveniles	sp.	1,2,3,6,10	41.4	eudominant
Sparassidae	<i>Eusparassus</i>	sp.	11,13,14	13.8	dominant
Theridiidae	<i>Latrodectus</i>	<i>pallidus</i>	1,4	6.9	subdominant
	<i>Paidiscura</i>	sp.	3	3.4	recedent
	<i>Steatoda</i>	sp.	6	3.4	recedent
	<i>Theridion</i>	sp.	6	3.4	recedent
	juveniles	sp.	6,11,14	10.3	subdominant
Thomisidae	<i>Thomisus</i>	<i>spinifer</i>	4,10	48.3	eudominant
	<i>Thomisus</i>	sp.	9,10,15	89.7	eudominant
	<i>Xysticus</i>	<i>lalandei</i>	2,6	6.9	subdominant
	<i>Xysticus</i>	sp.	11	3.4	recedent
Uloboridae	<i>Uloborus</i>	sp.	1,3,4	31.0	dominant

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